Measuring confidence levels of male and female students in open access enabling courses

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The study of confidence was undertaken at the University of Newcastle with students selecting science courses at two campuses. The students were enrolled in open access programs and aimed to gain access to undergraduate studies in various disciplines at University. The 'third person effect' was used to measure the confidence levels of the students in comparison to their peers. Using this technique, the study examines the extent to which students undertaking open access programs are confident in learning. The results for male and female students were compared and contrasted. Lack of confidence in learning arises predominantly in females with little educational experience and a distant educational background. Female students were also less optimistic in predicting the performance of a third person beginning the course. This paper argues the need to build confidence in students who experience high levels of uncertainty in learning. It is thought that building confidence in students in early stages optimises their academic success. It also provides for a smooth transition into the first year of undergraduate study and thus improves academic outcomes. The issues raised are important to educational research that serves higher education preparatory and admissions programs.

Introduction

Open access enabling programs encourage diversity and provide an alternative pathway for students who may not otherwise be granted entry to university (University of Newcastle, n.d. 1). An important aspect of encouraging diversity is to make sure that students have the skills to succeed in their academic pursuit. Factors such as integration, commitment, satisfaction, finances, prospective careers, support and psychology have been identified as important for academic performance in higher education (McKenzie & Schweitzer, 2001). Szulecka, Springett and de Pauw (1987) found that high levels of depression and anxiety are related to significantly higher incidence of withdrawal from University. However, a belief that one will perform successfully in a given course can predict actual successful performance in that course (McKenzie & Schweitzer, 2001).

Stankov, Lee, Luo and Hogan (2012) measured confidence, self-belief, self-efficacy, self-concept and anxiety in students aged 15 from Singapore and found that a distinct confidence factor exists in the domains of mathematics and English. Their focus on confidence was understood as a state of being certain about the success of a particular behavioural act. Stankov (1999) positioned confidence between cognitive abilities and personality. Confidence was plotted against success in these two areas and the findings indicated that confidence is important to success in mathematics. Morony et al. (2013) predicted achievement by measuring confidence against self-efficacy, anxiety and self-concept in Confucian Asia and Europe. They reported that confidence is a relatively new measure of self-belief, but is the single most important predictor of maths accuracy. They

observed that confidence ratings have not been elicited previously in large scale international studies in education, but use of confidence judgements in psychology has a long history dating back to early psychophysics.

Multiple studies over the past 20 years have demonstrated that confidence ratings from diverse cognitive tests tend to define a common factor, suggesting confidence is a trait in adults (Crawford & Stankov, 1996; Kleitman & Stankov, 2007; Stankov & Crawford, 1997; Stankov & Lee, 2008; Stankov, Pallier, Danthiir & Morony, 2012). A confidence score was compared to the percentage of correct answers in a test in order to assess the realism of the confidence judgements (Moore & Healy, 2008; Stankov, 2000). The finding was that confidence is certainly required for success, but high confidence and low accuracy is a problematic combination. Scherer (2013) provided evidence for the empirical distinction between self-concept and self-efficacy within the domain of chemistry. The importance of interventions which systematically combine the enhancement of self-perception and the development of competence in the classrooms was emphasised by this research.

Morton, Mergler and Boman (2014) studied the role of optimism and self-efficacy for first-year Australian university students. Their study concluded that students with high levels of optimism and low levels of depression and anxiety will adapt better when making the transition from high school to university. Many students experience difficulties in the transition to first year university studies, which is the time when the risk of discontinuing studies is greatest (Wintre & Yaffe, 2000). However, students with high levels of self-efficacy and low levels of depression will experience less life stress in their commencement year of university. Preckel, Niepel, Schneider and Brunner (2013) in studying self-concept, social self-concept and academic achievement (Flook, Repetti & Ullmann, 2005; Harter 1999; Valentine, DuBois & Cooper 2004) have also noted recently that fostering social and academic self-concepts are central educational goals.

McConney and Perry (2010) found that both student and school socio-economic status (SES) are strongly associated with student outcomes. They found that the relationship between mathematical achievement and school SES is slightly stronger for students with higher levels of self-efficacy than for their peers with lower self-efficacy. They concluded that it would be a moral and economic tragedy to attract lower socio-economic status (LSES) students without making the changes to teaching that are necessary to facilitate their success (Devlin, 2010). With the focus of higher education on supporting students to be adaptable, proactive lifelong learners, teachers have a responsibility to develop learning processes, which include assessment processes such as reflective learning, self-assessment and providing feedback. Students are agents of the outcomes of their learning process (Kamphorst, Hofman, Jansen & Terlouw, 2013). Although influences seem fairly modest, perceived competence seems relevant for achievement, as achievement seems relevant for perceived competence. Self-regulation and study skills (Tracy & Robins, 2004; Schunk, 2005), a deep approach to learning (Entwistle & Peterson, 2004) and motivation (Eccles & Wigfield 2002; Deci & Ryan, 1999) are important factors which can be influenced. For all participants in higher education it remains important to be aware that different learning objectives may evoke different study behaviours in students.

Komarraju and Nadler (2013) supported the essential role of self-efficacy in predicting academic achievement, and indeed providing students with clear examples, clarifying expectations, and providing feedback are all likely to provide scaffolding for students' attempts and help them to develop self-efficacy (Lane & Lane, 2001). They noted that students' self-efficacy or self-confidence for learning and performance is crucial for their academic achievement (Zimmerman, 2000). Self-efficacy is a multidimensional construct that is fundamental to the social cognitive approach and conceptualises individuals as being purposeful, proactive, self-evaluative, and regulatory (Bandura, 1988). Academic self-efficacy reflects a student's perceived competence with respect to tasks in the academic domain (Shunk & Pajares, 2002). Researchers have established academic self-efficacy as a significant predictor of academic performance (Brown, Riley, Walrath, Leaf & Valdez, 2008, Dahl, Bals & Turi, 2005; Kornilova, Kornilov & Chumakova, 2009). In quoting Marsh and Craven (2006, p. 159), Huang (2011) noted that if practitioners improve performance without also fostering participants' self-beliefs in their capabilities, then the performance gains are unlikely to be long lasting.

Tully and Jacobs (2010) explored gender differences and concluded that male students were influenced by positive male role models. Female students from single gender schools outscored their male engineering counterparts, but benefited more from verbal encouragement, contextualisation, same gender problem solving groups, and same gender classroom dynamics. Shaping curriculum, pedagogical practices and classroom culture at secondary school level to facilitate greater academic gains for young women in mathematics may possibly promote enhanced levels of self-perception of mathematical abilities, which may facilitate increased participation in engineering paths. According to some researchers, females feel less confident than males in pursuing university courses (Dryburgh, 2000; Hancock, Davies & McGrenere, 2002; Harrell, 1998; Todman, 2000; Wilson, 2002). A study by Stoilescu and McDougall (2011) specifically explored factors that alienate undergraduate female students and exacerbate gender disparities in confidence, performance, attitudes, and experience in undergraduate education. Women can face unique barriers that include negative stereotypes, negative influences and discrimination. In the past women have been faced with a lack of role models, lack of encouragement and insufficient opportunities to succeed in the areas of maths and science (Cordero, Porter, Israel & Brown, 2010). Several reasons have been postulated in the literature and include real and perceived challenges associated with balancing work and family life (Alpay, Hari, Kambouri & Ahearn 2010). There is growing literature that men are more confident than women in exam situations (Bengtsson, Persson & Willenhag, 2005).

Students who repeatedly underestimate their performance can lose motivation for learning, due to a lack of self-confidence. Similarly students who over estimate their performance may be at a disadvantage as their over confidence may impede their motivation to learn new techniques (Stankov, Morony & Lee, 2014). It is typical of enabling students that their past educational experience has been less than satisfactory (Hodges, Bedford, Hartley, Klinger, Murray, O'Rourke & Schofield, 2013). Various recommendations have been made to try to increase student interaction and confidence

and to reduce fear of failure, in an effort to make the transition to higher education a smoother journey (Chipperfield, 2013). While the study of confidence has a long history (Fullerton & Cattell, 1892; Henmon, 1911), studies on first year experience and retention have shown that students who are confident in their university study have better chances of remaining and progressing, compared to less confident students (Archer, Cantwell & Bourke, 1999; Habel, 2012). In this study it is argued that building confidence where confidence is low is important for academic success.

Astin (1985) and Pace (1988) agreed that an individual's involvement in learning as well as the quality of effort plays a central role in a student's development at university. Understanding the student experience plays a role in managing transitions to tertiary study and retaining students (Krause, 2005). Krause and Coates (2008) reinforced the primary educational role played by engagement. The student experience is important in setting up the educational foundations for academic success (Kuh, Gonyea & Williams, 2005; Upcraft & Gardner, 1989). However, there is still a lack of knowledge about how to be a successful student in a tertiary environment (Whannell, Whannell & Allen, 2012). In this study, the levels of uncertainty that students' experience in relation to their course were measured to get an indication of their confidence levels and prospects of success. This paper makes an important contribution in an area of limited research. Most research to date focuses on students from various equity groups at undergraduate level. Limited studies have been undertaken with disadvantaged students in open access enabling programs.

The current study deals with an important issue involving growing numbers of students considering open access enabling or bridging programs that provide a pathway into undergraduate degrees. Relationships exist between confidence, self-efficacy and resource allocation and these are part of an adaptive process (Beck & Schmidt, 2012).This study is important in highlighting the profile and characteristics of the disadvantaged students in open access programs who have experienced significant barriers limiting their access to higher education. According to Shah, Goode, West and Clark (2014), the barriers include location and distance from the university; financial pressures; low academic achievement in high school; failure to complete high school education due to illness or other personal reasons; lack of appropriate careers advice; parental discouragement of higher education due to limited university education attainment within the family; a lack of confidence in one's ability to undertake university education; parenting or carer responsibilities; mental health issues; and a variety of other social problems.

Methodology

The 'third-person effect' used in this study has proven to be a persistent and robust finding, but most research on this phenomenon has employed media stimuli with potentially harmful consequences for its audience. It has been hypothesised that it is a human tendency to see the world through optimistic or self-serving lenses in this context. Such an optimistic bias predicts that people will estimate greater effects on others than on themselves for messages with harmful outcomes, but no difference in effect for beneficial

messages (Gunther & Mundy, 1993). The third-person perceptions do depend on subjective knowledge: "The more people think they know, the greater are the perceived communication effects on others than on themselves" (Eisend, 2015, p. 54). A large body of social psychological research suggests that we think quite positively of ourselves, often unrealistically so (Fields & Kuperberg, 2015). Historically, people with learning disabilities have had little or no voice in the stories other people tell about them and their lives. A narrative therapy approach or third person approach has been used for people with learning disabilities who identify as lesbian, gay, bisexual or transgender (Elderton, Clarke, Jones & Stacey, 2013).

In this study we tested the third-person effect in a new context. The paper aims to quantify male and female student confidence level using a third person as a reference. The surveys were conducted with students enrolled in science based enabling courses. The surveys were paper based and were completed in class on the last day of the course prior to the final exam. The student demographic comprised of 51 males and 91 females in the 20-29, 30-39 and 40-49 age brackets. The 'third person effect' has been used in previous research to question responders about their perception of an ordinary reasonable person (Baker, 2011). In the present study, students' perceptions of themselves are compared with their perception of another student beginning the course. The students were asked to judge their own performance in comparison to the performance of the third person in a similar situation. When compared, the scores show up a lack of confidence in the student's perception of themselves in comparison to another person. Appendix one lists the questions in the survey. The surveys were designed with six parallel questions asking the student to rate a third person and then themselves in a similar situation.

Findings

The results were obtained from 142 students who completed an identical course across two campuses of Newcastle University. Overall, the results showed a significant disparity between the students' perception of themselves compared to a third person. The disparity provides evidence that the enabling students are less confident about the course overall, the mid-semester test, how they relate to the lectures and tutorials, the textbooks, the quizzes and particularly the exam, than they perceive a third person starting the course would be. The results indicated that the students' related fairly equally to the lectures and tutorials when they compared themselves to a third person. The greatest difference between the student's perception of themselves and the third person occurred when the students were asked about the assessment items; the mid-semester test, the quizzes and the final exam. The results reveal that the students were less confident or more uncertain about their own performance than they would be of a third-person starting the course in the same position (Figure 1).

To determine the segment and demographic of students who suffer most from a lack of confidence, the results were separated by gender, educational background, age bracket and campus. When separated by gender the results proved to be most significant and meaningful. Responses for the 51 males who participated in the study are shown in Figure

2. The results from the male respondents show that overall there was little difference in their perception of their own success, even when they compared to themselves to a third person. The male students did indicate a slight lack of confidence or degree of uncertainty in relation to the assessment items: the mid-semester test, the quizzes and the final exam. It was also evident that the male students' perception of themselves was slightly lower when compared to a third person starting the course in regard to the quizzes and the exam.

Table 1: Mean results and standard errors (N=142) student cohort

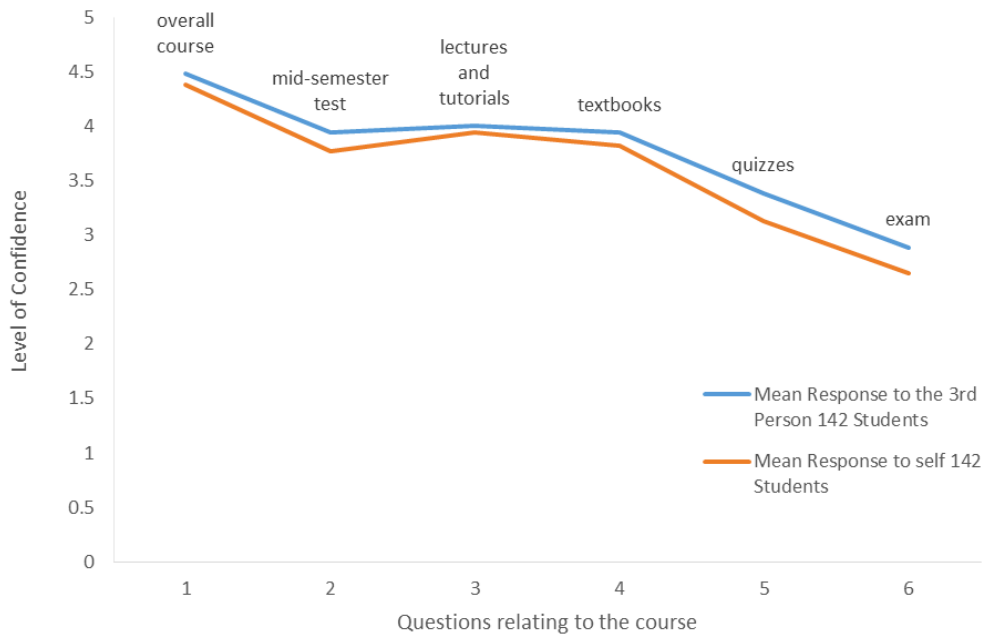|	Overall course		Mid-semester test		Lectures and tutorials		Text books		Quizzes		Exam	
	3rd person	self	3rd person	self	3rd person	self	3rd person	self	3rd person	self	3rd person	self
Mean	4.486	4.380	3.951	3.775	4.007	3.944	3.944	3.824	3.387	3.127	2.887	2.655
SE	0.054	0.066	0.059	0.076	0.065	0.066	0.080	0.093	0.076	0.091	0.081	0.076

Figure 1: Student confidence survey findings (N=142)

Table 2: Mean results and standard errors for male students (n=51)

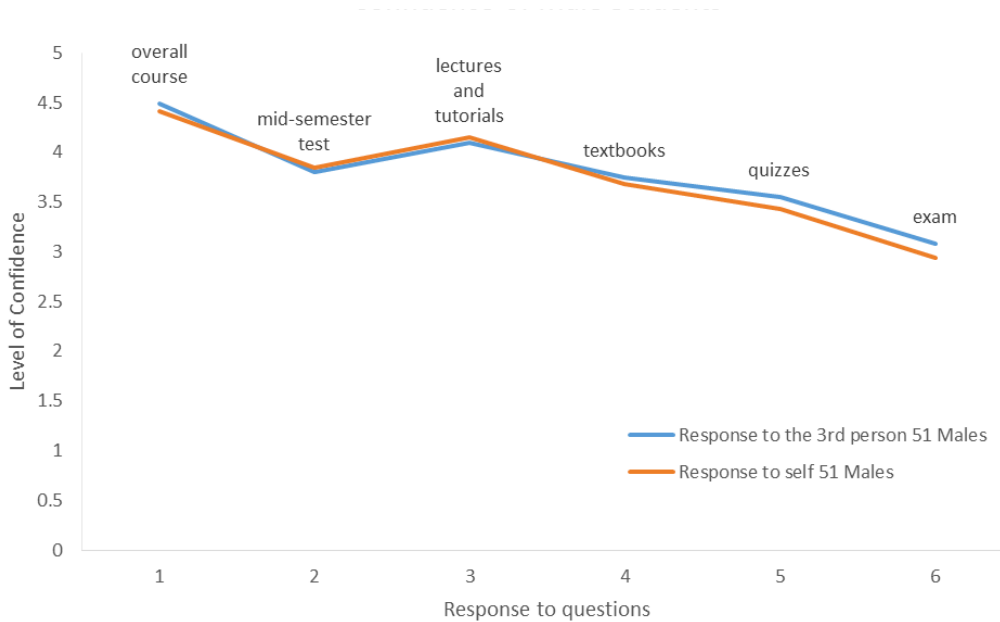|	Overall course		Mid-semester test		Lectures and tutorials		Text books		Quizzes		Exam	
	3rd person	self	3rd person	self	3rd person	self	3rd person	self	3rd person	self	3rd person	self
Mean	4.490	4.412	3.80	3.843	4.098	4.157	3.745	3.686	3.549	3.431	3.078	2.941
SE	0.099	0.102	0.105	0.120	0.090	0.102	0.153	0.174	0.110	0.151	0.158	0.136

Figure 2: Male student confidence survey findings (n=51)

Results pertaining to the 91 female students within the total 142 student cohort are presented in Figure 3. The results indicate a significant lack of confidence and higher level of uncertainty experienced by the female students in every area surveyed. The results show a significant difference between the female students' rating of their own confidence levels in comparison to their rating of a third person. This uncertainty applied to their perception of the course overall, their performance in the mid-semester test, how they related to the lectures and tutorials, whether it was important to get the textbook early, their performance in the quizzes, and their performance in the final exam. The female students showed a much higher level of uncertainty and lack of confidence in comparison to the males in all areas. There was a significant difference in confidence levels of female students in relation to the test, quizzes and exam when compared to their perception of a third person embarking on the same course. The highest level of uncertainty related to the

final exam. The female students rated their performance significantly lower than a fictitious third person in the mid semester test and the final exam.

Table 3: Mean results and standard errors for female students (n=91)

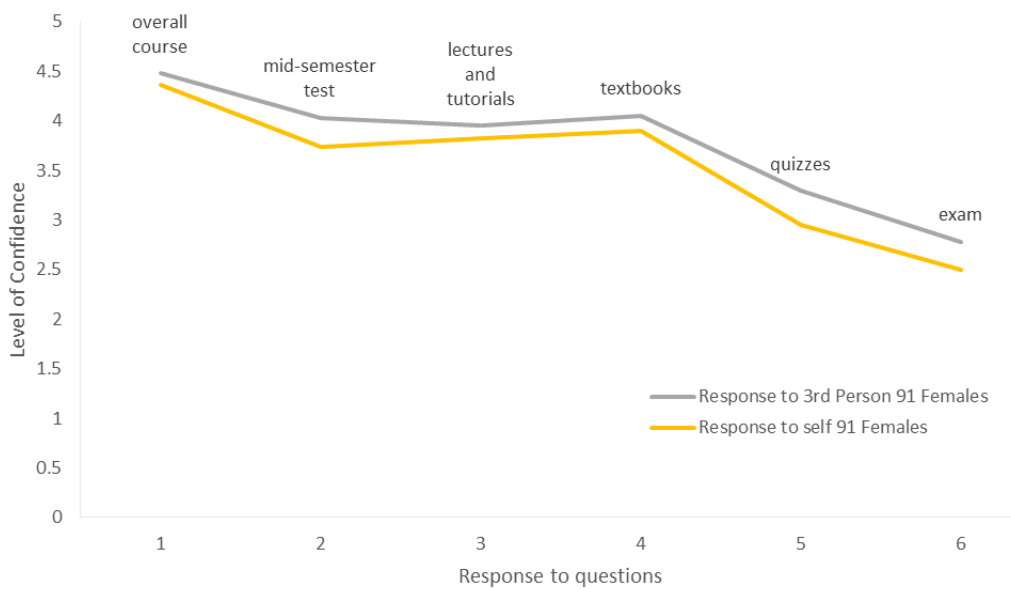|	Overall course		Mid-sem test		Lects and tutorials		Text books		Quizzes		Exam	
	3rd pers	self	3rd pers	self	3rd pers	self	3rd pers	self	3rd pers	self	3rd pers	self
Mean	4.484	4.363	4.033	3.736	3.956	3.824	4.055	3.901	3.297	2.956	2.780	2.494
SE	0.063	0.086	0.071	0.097	0.088	0.084	0.090	0.107	0.101	0.110	0.090	0.086

Figure 3: Female student confidence survey findings (n=91)

Table 4 shows a breakdown of the female student demographic which was separated according to age bracket and level of high school completed. The results show that where there is a low level of education or a distant educational background in females, then confidence levels are also low. Overall, the female students showed low confidence levels when asked to predict their performance in the final exam. Female students in the 40-49 age bracket who had completed year 12 at high school rated their performance lowest. The largest drop in confidence was seen in women of the same age group that had not completed year 10 or year 12 at high school. The drop in confidence occurred when these female students were asked to rate their own performance in comparison to a third person in the same position beginning the course.

Table 4: Mean results and standard errors for female responses
to questions relating to the final exam

Female student demographic		Response	3rd person	self
Female no high school completed	Age 20-29	Mean	2.667	2.333
		Standard error	0.333	0.667
	Age 30-39	Mean	2.000	2.000
		Standard error	0.000	0.000
	Age 40-49	Mean	3.667	3.000
		Standard error	0.333	0.000
Female Yr 10 high school completed	Age 20-29	Mean	2.842	2.316
		Standard error	0.158	0.154
	Age 30-39	Mean	3.000	2.667
		Standard error	0.000	0.667
	Age 40-49	Mean	2.667	2.667
		Standard error	0.333	0.333
Female Yr 12 high school completed	Age 20-29	Mean	2.804	2.608
		Standard error	0.128	0.112
	Age 30-39	Mean	2.667	2.333
		Standard error	0.667	0.667
	Age 40-49	Mean	2.000	1.800
		Standard error	0.447	0.583

Table 5 presents the mean academic results for male and female students according to assessment items. Little variation existed between the genders. Surprisingly the male students scored lower in every form of assessment despite their confidence being higher. There was also a higher variation in the results for each of the assessment items carried out by males indicating that there was greater variation in skill levels of the male students who participated in the course. Importantly, the final assessment results for the female students hid the low confidence levels reported by female students.

Table 5: Final assessment results for female (n=91) and male (n=51) students

Assessments	Male mean results	Female mean results
Quizzes /15%	8.164 ± 3.413	8.382 ± 2.807
Assignment / 15%	12.278 ± 3.253	12.860 ± 1.979
Test / 10%	7.218± 1.669	7.229 ± 1.475
Lab / 10%	7.852 ± 2.831	8.178± 2.138
Total progressive / 50%	35.513 ± 8.486	36.649 ± 5.799
Exam multiple choice / 75%	42.167 ± 14.757	42.526 ± 12.402
Exam short answer / 25%	10.750 ± 5.529	11.086± 5.058
Total exam / 100%	52.917 ± 19.774	53.612± 16.815
Exam total / 50%	26.458 ± 9.887	26.806 ± 8.408

Discussion

There are almost twice as many women as men entering science based enabling programs across two campuses of the University of Newcastle. Anecdotal evidence suggests that there is no significant difference between progressive assessment results or exam results of male and female students. If anything, female students in higher numbers are more likely to achieve higher results. The student responses reported in this study show that although the odds are in favour of female students achieving higher results due to their higher numbers, there is a distinct difference between male and female confidence levels. A slight lack of confidence was apparent in male students in relation to the assessment tasks that involved the quizzes and the final exam. A significant lack of confidence occurred in females in relation to all areas, including their satisfaction of the course overall, the mid-semester test, the way they related to the lectures and tutorials, whether it was important to purchase the textbook early, their performance in the quizzes and their performance in the final exam.

The responses of the total student cohort comprising 142 students shows that although students were positive about the way the course was conducted, they were less positive when comparing themselves to a third person in relation to the mid-semester test, the lectures and tutorials, the textbooks, the quizzes and especially the exam. Interestingly the total student cohort rated themselves almost equally when asked to what degree they related to the lectures and tutorials in comparison to the degree a third person would relate to the lectures and tutorials. The total student cohort rated the overall course delivery highly. The students related to the lectures and tutorial highly and the concept of getting the textbooks early was also rated highly. Greater levels of uncertainty revolved around the assessment items including the mid-semester test, the quizzes and the final exam. As expected the highest levels of uncertainty across all the students was in relation to the final exam. The uncertainty relating to their performance in the final exam occurred when students compared themselves to a third person.

Figure 2 showed little difference between how the male students perceived themselves in comparison with a third person. Interestingly, the male students had a higher level of self confidence in relation to the mid-semester test and reported higher self confidence in relating to the lecture and tutorial material. Males reported that it would be important for a person starting the course to get course textbooks early, but it was not as important for themselves. Higher uncertainty in male students was apparent in relation to the quizzes and the exam, when comparing themselves with a third person. Division by gender into male and female students revealed that students have significant differences in levels of uncertainty in relation to all aspects of the course. The female students showed a significant lack of confidence in relation to the exam. There may be a lingering perception that science is an area where men dominate and succeed. The perception that prior knowledge of technology is necessary may also be responsible for women having less confidence and high uncertainty in relation to aspects of the course.

Responses of female students within the cohort of open access enabling students were presented in Figure 3. Notably, the female students reported significantly higher levels of uncertainty in all areas of the course when compared to the male students. Females rated their experience with the course overall, lectures and tutorials and textbooks as significantly lower in comparison to a third person in the same position. Significant differences in uncertainty and confidence were apparent in female responses for the assessment items which included the mid-semester test, quizzes and the final exam. There was a clear and significant difference between the responses of male and female students with females experiencing higher uncertainty and lower confidence than males. Interestingly the female students were not only more uncertain but they were also less optimistic in predicting the performance of a third person in the final exam than the males were. Despite this, the female students achieved marginally higher results in all areas of the assessment including progressive assessments and the exam. Women in the 40-49 age bracket were least confident about their performance in the final exam. It is highly likely that this group suffers lack of confidence due to distant and/or lack of educational background.

Conclusion

Enabling students come from diverse range of backgrounds and have had to overcome a multitude of barriers to begin studying. It is clear that their confidence is low and that they experience a lack of confidence throughout their courses leading up to exams. While men can be over confident in some areas, women appear to lack confidence in all areas. Overall, female students indicated that they were less optimistic than males in predicting the performance in exam situations. These differences were especially clear where women have little educational background and distant educational experience. For example, women in the 40-49 age bracket appear to be particularly vulnerable and lack confidence in approaching the final exam.

These findings are significant for understanding the thinking patterns of students that embark on their journey to university via open access enabling courses. The findings provide evidence that supporting programs to raise the level of student confidence should be continued. Designing programs to lower the levels of uncertainty has important impacts in optimising academic success. It is important to understand the mindset of the student cohort and be able to identify and focus in on the group of students who experience high levels of uncertainty and to apply services correctly. The knowledge gained can also help to accommodate at risk students and help them to adapt to the important aspects of the course. It is normal practice for tutors in online and on campus modes to identify students at risk (University of Newcastle, n.d. 2). Ultimately, students showing low levels of confidence and high levels of uncertainty influence retention rates and put at risk the student's transition to university. The knowledge obtained in this study with correctly applied services could improve retention rates and completion rates by targeting students at risk and improving their confidence. This will change and improve teaching practices by empowering at risk students. The implications are that in time, improvements to institutional outcomes and perhaps national outcomes could occur.

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Appendix 1: Student Survey (Semester 1, 2014)

If you agree to participate in this survey you will be asked to fill out the twelve questions below. Information about your gender, age and educational background will be gained but the survey is anonymous.

Please tick the appropriate box

Male   **Age 20-29**
Female   **Age 30-39**
                                                                               Age 40-49
                                                                               Age 50-59
                                                                               Age 60+

Please mark your choice below:

1. I would recommend this course to a friend who might be starting Open Foundation next year?

strongly disagree   disagree   uncertain   agree   strongly agree

2. Were you satisfied with the way the course was conducted?

strongly disagree   disagree   uncertain   agree   strongly agree

3. Would you expect that your friend would do well in the mid-semester test?

strongly disagree   disagree   uncertain   agree   strongly agree

4. How would you rate your score in the mid-semester test? Did you do well?

strongly disagree   disagree   uncertain   agree   strongly agree

5. Would you expect that someone starting the course would understand and relate to the lecture material and tutorials?

strongly disagree   disagree   uncertain   agree   strongly agree

6. Do you feel that you understood and related to the lecture material and tutorials?

strongly disagree   disagree   uncertain   agree   strongly agree

7. Would it be important for someone starting the course to get the textbooks early?

strongly disagree   disagree   uncertain   agree   strongly agree

8. Was it important for you to get the textbooks early?
strongly disagree   disagree   uncertain   agree   strongly agree

9. Would you expect that someone starting the course would be satisfied with their scores for the quizzes?
strongly disagree   disagree   uncertain   agree   strongly agree

10. Are you satisfied with your scores for the quizzes?
strongly disagree   disagree   uncertain   agree   strongly agree

11. Do you think someone starting the course could achieve a score of 100% in the exam?
strongly disagree   disagree   uncertain   agree   strongly agree

12. Do you think you could achieve a score of 100% in the exam?
strongly disagree   disagree   uncertain   agree   strongly agree

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